

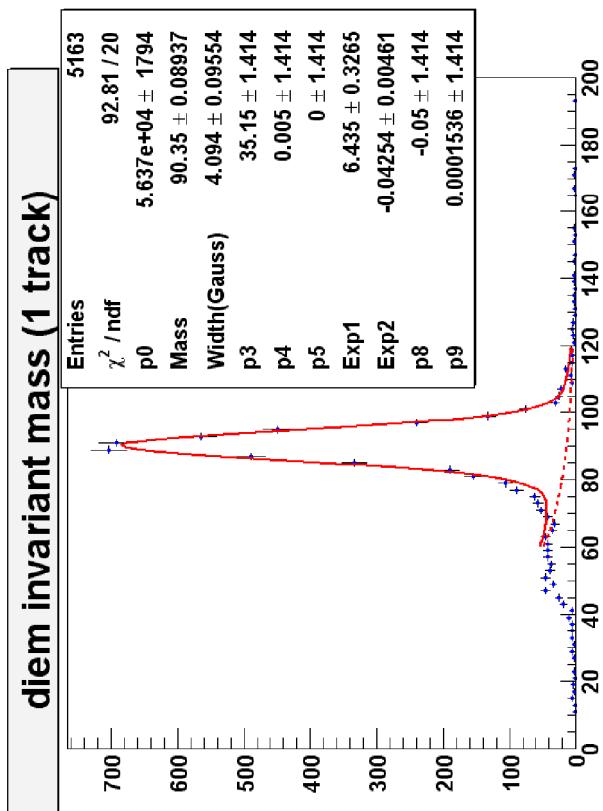
Status of my background studies

MC studies (PYTHIA): Taking background MC processes and running them through my analysis code using the standard cuts. Then using the cross sections for the normalisation.

Process	xsection in pb	#of Z(ee) events passing all cuts
W->enu	1899	5
Z->tautau	182	2
W->taunu	1903	<1
Z(ee)Z(bb)	.002	<1
WZ	.05	<1

QCD background based on fitting

- Full dataset
- CC-CC topology
- Standard cuts with at least 1trk match requirement
- Fitting exponential and convolution of Gaussian & BW to the diem invariant mass plot to separate pure Z->ee from DY+QCD
- Then using WZgroups result of (1.7+-4)% for the percentage of events attributable to the photon propagator in Z/Gamma^{*}->ee to get number of signal events (pure Z->ee plus DY) and number of events from QCD.

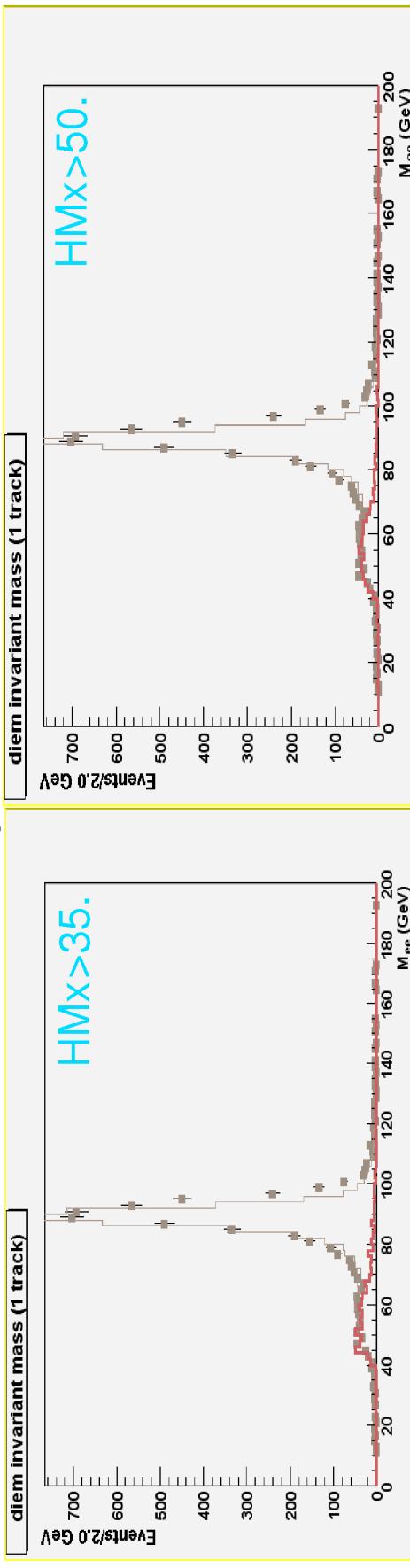


QCD background a la WZgroup

- Fitting the diem invariant mass distribution to a linear combination of a signal shape, obtained from Z/Gamma* events (Pythia), and a background shape determined from data based on 'anti-electron' cut. In more detail: I calculate the chisquare between the diem invariant mass distribution and the lin.comb. of the signal and background shapes. Then I use ROOTs TMinuit class (Minimisation package) to minimize the chisquare based on the MIGRAD minimisation algorithm.

Note: I also apply an additional 3% Gaussian smearing to the MC Z peak to match the width of the peak in data: **E(unsmeard) = E(smeared) * (1 + Gauss * .03)**

- The anti-electron cut is HMx>35.0 (good electrons are required to have HMx<20.). As a systematic check I also did the whole thing for HMx>50.

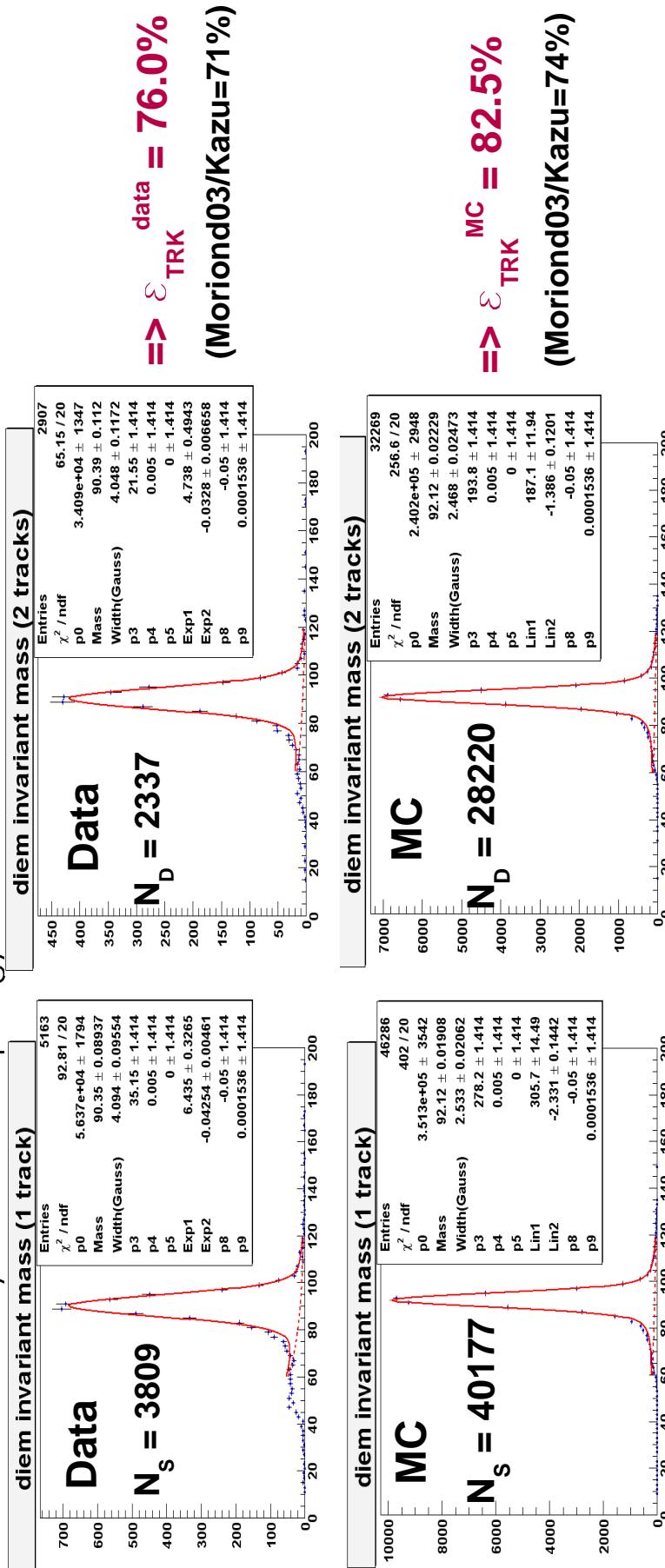


$$\Rightarrow \text{Signal} = Z + DY = 3870 \quad \Rightarrow \text{Background} = QCD = 79$$
$$= \text{Signal} = Z + DY = 3895 \quad = \text{Background} = QCD = 54$$



Trackmatching/finding efficiencies in data and MC

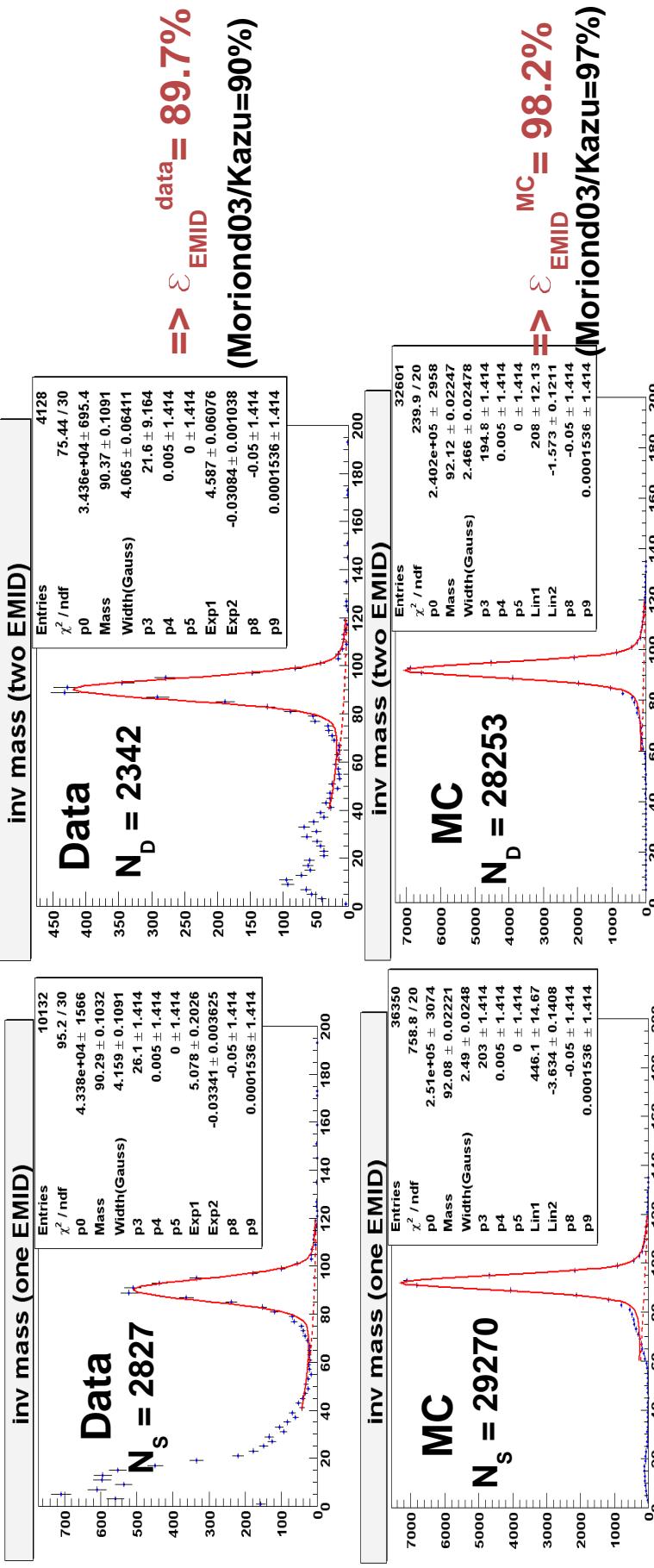
- N_s = # of events with 2 trk matches
- N_d = # of events with at least 1 trk match
- Efficiency = $2N_d/N_d + N_s$
- Fit: Gaussian+BW for signal and exponential(data)/linear function (MC) for background
- All of this only for CC-CC topology!



EMID efficiencies for data and MC

- N_s = # of events where 2 EM objects pass EVID cuts
 - N_D = # of events where at least one EM object passes EVID cut
 - Efficiency = $2N_D / N_D + N_s$

- Fit: Gaussian+BW for signal and exponential(data)/linear function (MC) for background
- All of this only for CC-CC topology!



Acceptance

- By 'Acceptance' i mean the geometrical and kinematical acceptance corrected for differences in EMID and trackmatching/finding efficiencies between data and MC.
- To get the geometrical and kinematical acceptance I simply divide the number of events with 2 electrons passing $pT > 20\text{ GeV}$, $|\det_{\text{eta}}| \leq 1.1$ and $(80\text{ GeV} \leq M_{ee} \leq 100\text{ GeV})$ by the total number of events in my MC sample: $42357 / 247000 = 17.1\%$
- I then correct this for the differences in EMID and trackmatching /finding efficiencies in data and MC (based on the numbers from the previous two slides):
 - $A = 17.1\% * (89.7\% / 98.2\%)^2 * (76.0\% / 82.5\%)^2 = 12.1\%$
- Seems reasonable (?). Kazu got 15.7% as his final number, but he required $|\det_{\text{eta}}| < 2.3!$
- I still need to estimate the effect due to the choice of PDF in the MC. The WZgroup calculated a relative change with respect to CTEQ4L of +1.4% (compared to CTEQ5L).